LAMASUS
Land Management for Sustainability



Report on the Norwegian Roadshow

Tighter fertilization rules to regulate nutrient management in intensive agriculture

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Table of Contents

1. Introduction 1
2. Organization and participation 1
3. Fertilizer regulation: Present situation and future scenarios 1
3.1. Present situation 1
3.2. Adaptation scenarios 2
3.3. Stakeholder discussion 4
4. LAMASUS Dashboard 4
5. Conclusion and outlook 5
6. References 5
7. Annex 6
7.1. Information and Agenda 6
7.2. Pictures 8

1. Introduction

The LAMASUS (Land Use and Management Modelling for Sustainable Governance) project is concerned with the economic and environmental effects of changes in land-use-related policies. It applies economic modelling and the concept of 'roadshows' to discuss and evaluate model results with farmers and others who are likely to be affected by the simulated land policy changes.

2. Organization and participation

The Norwegian roadshow took place on March 3rd in the city of Bryne in Rogaland county, South-West Norway, and was titled *"Effects of the new fertilizer regulation for agriculture in Jæren"*. The roadshow was organised by Ruralis in cooperation with the local partner *Rogaland Landbrukspark,* which is an umbrella organisation for businesses and organisations within the agricultural sector in Rogaland. Jæren is part of Rogaland county and considered one of the most intensive agricultural regions in Norway.

The event was organized as a half-day workshop to maximize participation. As the main goal was to facilitate the participation of farmers, it was considered important to keep the roadshow short.

Overall, 31 participants attended the roadshow representing a broad and diverse mixture of the agricultural community in Jæren. About one-quarter (27%) were farmers and/or representatives of farmer organizations. About one-fifth (20%) represented firms in the cereal, dairy, and meat sectors: firms organized as stakeholder-owned or cooperative (i.e., farmer-owned) businesses. Research institutes and extension services were represented with 10 participants (33%). In addition, there were representatives from the financial sector such as accounting firms and local banks. Finally, the agricultural official of the county governor was also participating. Many participants were, in addition to having their main occupation, part-time farmers. One-fifth (20%) of the roadshow participants were women.

3. Fertilizer regulation: Present Situation and Future Scenarios

3.1. PRESENT SITUATION

Norwegian agriculture is often associated with small-scale farming under harsh climatic conditions. However, the Jæren region in the southwest of the country stands out. With Jæren's flat terrain, sandy soils, and highly productive grasslands, agricultural conditions in

the region resemble conditions in Denmark more than most other Norwegian farming areas. Although Jæren covers only a small share of Norway's agricultural land, the region produces a disproportionately large share of the country's food and is characterized by intensive livestock farming with high stocking densities.

High livestock density comes with significant environmental costs. Large animal populations, limited available land, and significant imports of feed and mineral fertilizers have resulted in nutrient surpluses, particularly of phosphorus. Phosphorus runoff from grasslands has contributed to the eutrophication of surface waters, threatening valuable freshwater and marine habitats.

To address this challenge, the Norwegian government has revised its fertilizer laws, placing special emphasis on limiting phosphorus applications from animal manure, excreta deposited by grazing animals, and mineral fertilizers.

Given the high livestock density in the Jaeren district, the region is subject to stricter phosphorus application limits. Previously, farmers were permitted to apply up to 35 kg of phosphorus per hectare. Under the revised regulation, this limit will be reduced in three stages, reaching 27 kg P per hectare by 2033.

The Norwegian agricultural sector is supported by a comprehensive set of policy instruments designed to maintain existing farm structures, ensure food security, and provide income support to farmers. These instruments include, among others, a quota system for milk, various price support schemes, and degressive coupled payments for livestock. Support payments are differentiated by geographic zones to compensate for climatic and other natural production constraints resulting from local pedoclimatic conditions. As a result, Norway is among the OECD countries with the highest levels of agricultural support, both in absolute terms and relative to farm receipts (OECD, 2025).

Baseline calculations exemplify how differences in farm structure influence phosphorus loads. Farms located in coastal areas typically have higher stocking densities because favorable growing conditions support high grassland yields. In contrast, inland farms typically manage larger land areas but keep fewer livestock per hectare. This is partially because inland terrain is often steeper and stonier, limiting opportunities for intensive forage production and making grazing the predominant land use. Consequently, a clear spatial divide emerges: coastal farms are more likely to exceed the future application limit of 27 kg P per hectare, whereas inland farms generally have lower P loads per hectare.

However, a lower average phosphorus load does not necessarily imply that inland farms are unaffected by the revised regulation. Compliance is assessed at both the crop and plot levels. As a result, farms with an overall P load below the regulatory threshold may still face challenges if they lack sufficient suitable land for spreading the manure accumulated during the winter period.

3.2. ADAPTATION SCENARIOS

To assess possible adaptation pathways to the revised fertilizer regulation, we applied a bioeconomic farm model to more than 100 dairy farms drawn from the national register of farms applying for agricultural subsidies. The analysis considered five adaptation options: (1) reducing the amount of manure produced through improved herd management, manure

export to farms outside the region, or reductions in livestock numbers; (2) increasing manure use efficiency through advanced application technologies or changes in grassland management intensity; (3) applying manure to previously unfertilized or extensively managed grassland; (4) changing the farm's production mix; and (5) exiting farming.

The results indicate that manure export is the most cost-effective compliance strategy for almost all farms. Assuming transport costs of NOK 7 per km and m^3, farm profits could decline by up to 10% under the revised regulation. Additional adaptation strategies include small-scale adjustments in herd management, such as reducing the replacement age of heifers to lower manure production, reducing fertilizer inputs, and changing cropping patterns. While these measures seem promising in the analysis, their implementation on commercial farms may be challenging, as they often require multiple incremental management changes that individually contribute only modest reductions in phosphorus surpluses.

Despite the need to comply with stricter phosphorus application limits, some farms seem to be able to maintain their current milk production levels. Their adaptation strategy lies in reducing beef production. This outcome is largely explained by Norway's high support levels targeted towards production, including production quotas, price support, and coupled livestock payments. As long as manure export remains a financially attractive option, farms have little incentive to undertake more fundamental structural adjustments.

Because manure transport costs depend on transport distance and the availability of receiving farms, we evaluated a range of transport cost scenarios. The analysis shows that transport costs dictate the compliance costs to adapt to the revised regulation. Higher transport distances or transport costs, make manure export less profitable. For some farms, manure export remains the dominant adaptation strategy. For other farms, transport of manure becomes too costly. These farms reduce their dairy herd and, consequently, milk production.

The overall results show that compliance costs are key for farm adaptation. In particular, compliance costs must be relatively high before farms start reducing their herds. This is due to the high profitability of dairy farming. The current policy framework therefore tends to encourage farms to comply by relocating nutrient surpluses rather than by reducing nutrient generation. As long as manure transport costs stay low, reducing livestock numbers is not profitable, and production levels are largely maintained.

Manure transport depends on the availability of farms that can beneficially use the manure as fertilizer. As regional phosphorus surpluses increase, manure may need to be transported over progressively larger distances, increasing transport and transaction costs. This regional dimension was beyond the scope of the present study but is likely to become increasingly important for the long-term effectiveness of the regulation.

To foster a more resilient sector that acknowledges the carrying capacity of the land to minimize environmental harm, policy incentives such as a fertilizer tax or buy-out schemes could encourage more structural adaptation. However, such measures would also involve trade-offs with other policy goals, including food security. The results therefore highlight the need to balance environmental objectives with economic viability and food security, while ensuring that policy instruments are coherent across spatial scales and over time.

Although the study focuses on the Jæren region, the findings have broader relevance. Intensive livestock production systems facing nutrient surpluses and water quality challenges

are common throughout north-western Europe. Intensive livestock farming and nutrient-driven water pollution are common throughout north-western Europe. Similar production systems and pedo-climatic conditions make the Norwegian case particularly relevant to regions in Denmark or southern Sweden.

Stricter policies are likely to increase costs in the short term; in the long run, they may encourage a more resilient agricultural structure— in which livestock numbers are better aligned with the land's actual capacity, and farmers are less dependent on imported fodder and fertilizers.

3.3. STAKEHOLDER DISCUSSION

After the presentation of the main results summarized in the preceding section, the workshop continued with a discussion of the model, assumptions, and results. Stakeholders expressed satisfaction with the approach of including a broad number of different dairy farms to increase the heterogeneity embedded in the farm population. Critical remarks were raised regarding the assumption of the (1) manure transport costs, and (2) option to fertilize previously unfertilized extensively used grassland. The transport costs were considered too low, and the fertilization option was considered not feasible. This is, according to the stakeholders, because these grasslands are in nature-sensitive, protected areas. Fertilization would require the consent of the local authorities, which is unlikely to be given. This important information was not known at the time the model simulations were conducted. It underscores the importance of involving local stakeholders in the research process through activities like the roadshows.

The stakeholder discussion showed that the farmers were quite clear that tightening the fertilizer regulation does not leave the farming community much leeway to avoid a reduction of livestock numbers. Technologies to bring down fertilization rates are rare, and the option to get rid of manure through exports is costly. Trade-offs between agricultural and environmental policy goals seem therefore unavoidable.

4. LAMASUS Dashboard

A considerable part of the workshop was devoted to the LAMASUS Dashboard. After a short introduction to the dashboard, participants were asked about its usefulness and whether they could imagine using it as a means to facilitate discussions about agricultural policy matters both within the agricultural community and beyond. Most participants were neutral or positive concerning the information and content provided by the dashboard. Participants were, however, more reluctant to actively use the tool as a means of communication, exchange, and discussion. It was said that many organisations and firms already have established their own communication tools inside their organisations. Therefore, they did not see the point of establishing a new tool in addition to the already existing ones. However, the idea of the dashboard as providing a tool for communication between people inside and outside the agricultural community may still be regarded as useful.

5. Conclusion and outlook

The Norwegian LAMASUS roadshow demonstrated the importance and added value of linking bioeconomic farm models with practical, local experience. The modelling framework was well received and filled a gap in the agricultural policy analysis toolbox for Norway. At the same time, the discussions showed the need for close contact with local stakeholders to verify critical assumptions to ensure credibility and acceptance among stakeholders.

A key message emerging from the workshop was the importance of sustained dialogue between science and practitioners with hands-on experience. Quantitative models can identify trends and simulate scenarios, but they must be continuously confronted with the practical knowledge of farmers, regional authorities, and other local actors. Such an exchange helps refine modelling assumptions, reveal blind spots, and ensure that policy recommendations are grounded in real-world conditions. The roadshow illustrated that meaningful land-use governance in intensive agricultural regions such as Jæren requires not only robust analytical tools, but also strong and continuous interaction between research and practice. In addition, the example of the fertilizer regulation also showed that trade-offs between agricultural and environmental policy goals may sometimes be unavoidable and require careful considerations by policymakers in their effort to balance multiple, conflicting policy ambitions. The illustration of these trade-offs is an important goal of the LAMASUS project.

6. References

OECD. 2025. Agricultural Policy Monitoring and Evaluation 2025. OECD. Paris.

7. Annex

The documents in the Annex were shared in advance to the workshop with the stakeholders.

7.1. INFORMATION AND AGENDA

Information on the website (https://www.landbrukspark.no/temamote-om-konsekvenser-av-nytt-gjodselregelverk-for-jordbruket-pa-jaeren-3-mars-2026-kl-11-30-15-00/):



Agenda:

LAMASUS Land Management for Sustainability Ruralis Rogaland Landbrukspark

Temamøte om konsekvenser av nytt gjødselregelverk for jordbruket på Jæren

3. mars 2026
kl. 11.30-15.00

Møtested: NIBIO Særheim, Veksthusloftet

Arrangør: Ruralis og Rogaland Landbrukspark

11:30 – 12:00	Lunsj
12:00 – 12:10	Velkommen til møtet og program for dagen v/Helga Hellesø (Rogaland Landbrukspark)
12:10 – 13:00	Presentasjon av økonomiske konsekvenser av innføring av nytt gjødselregelverk for ulike produksjoner på Jæren v/Klaus Mittenzwei (Ruralis)
13:00 – 13:45	Spørsmål og diskusjon
13:45 – 14:00	Kaffepause
14:00 – 14:30	Bondens erfaringer med endra jordarbeiding og mulig marked for organisk materiale fra jordbruket v/Egil Petter Stræte (Ruralis)
14:30 – 15:00	Spørsmål og diskusjon

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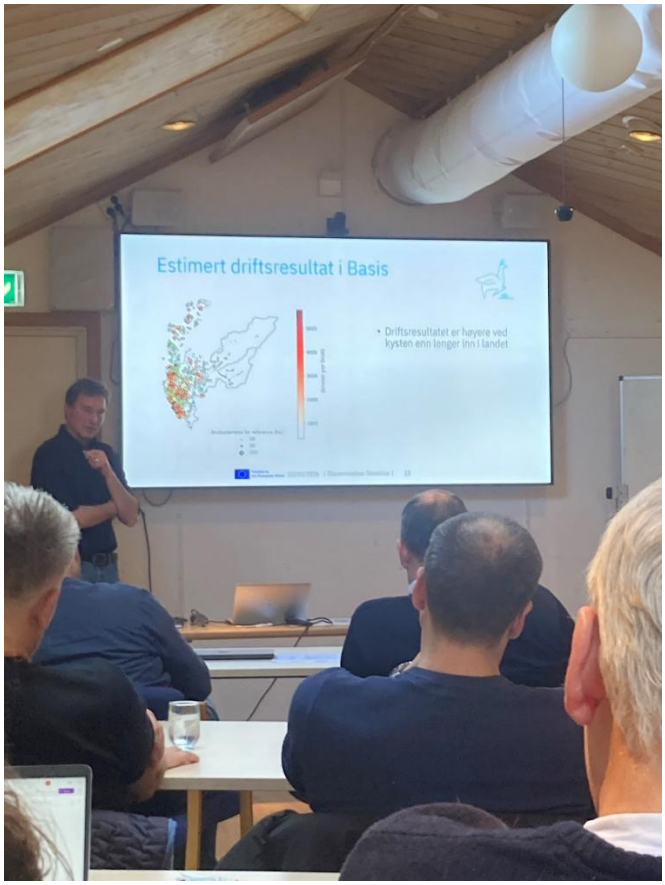
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7.2. PICTURES


Økonomiske konsekvenser av innføring av nytt
gjødselregelverk for ulike produksjoner på Jæren






Estimert driftsresultat i Basis
• Driftsresultatet er høyere ved kysten enn lenger inn i landet


Foreløpig diskusjon
Hvorfor er det billigere å
Hvorfor er det lønnsomt å legge om driften
Hvorfor gir forsatt økonomisk
variasjon mellom bruk
Hva:





